

U.S.S.N.: 10/003,986
Reply to Office Action dated November 18, 2003
Attorney Docket No. 10541-449

I. Listing of the Claims:

1. (Previously Presented): An instrument pointer illuminating apparatus comprising:

a gage motor with a gage motor shaft extending therefrom;

an instrument pointer mounted on said gage motor shaft;

a plurality of light sources positioned radially around said gage motor shaft adapted to supply light upward into said instrument pointer;

said instrument pointer including a hub with a top surface and a bottom surface and a needle portion and a light reflecting portion mounted onto said top surface of said hub, said light reflecting portion being flared outward from said needle portion, said light reflecting portion having a first reflective surface presenting an internally reflective surface adapted to reflect light received from said light sources outward into said needle portion; and

a light guide mounted to said bottom surface of said hub portion adapted to propagate light from said light sources upward into said instrument pointer.

3. (Previously Presented): The instrument pointer illumination apparatus of claim 1 wherein said light reflecting portion is adapted to cover substantially all of said top surface of said hub to reflect substantially all of the light from said light sources outward into said needle portion at any angular position of said needle portion.

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4. (Original): The instrument pointer illumination apparatus of claim 3 wherein said light reflective portion is flared outward from said needle portion across said hub.

5. (Original): The instrument pointer illuminating apparatus of claim 1 wherein said light reflecting portion includes a plurality of reflective surfaces adapted to reflect light received through said hub portion outward into said needle portion.

6. (Previously Presented): The instrument pointer illuminating apparatus of claim 5 wherein each of said reflective surfaces presents an internally reflective surface adapted to reflect light from said light sources outward into said needle portion.

7. (Original): The instrument pointer illuminating apparatus of claim 5 wherein said plurality of reflective surfaces are matched to each other such that light is reflected from each of said reflective surfaces outward into said needle portion.

8. (Original): The instrument pointer illuminating apparatus of claim 1 wherein said needle portion includes a top surface and a bottom surface, said top surface being coated with a top diffusing material adapted to diffuse light outward through said top surface, and said bottom surface being coated with a material adapted to internally reflect within said needle portion substantially all of the light which hits said bottom surface.

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10. (Original): The instrument pointer illuminating apparatus of claim 1 wherein said light sources are positioned radially around said gage motor shaft and axially below said pointer and are adapted to supply light upward into said light collecting portion.

11. (Original): The instrument pointer illuminating apparatus of claim 1 wherein each of said light sources includes a lens for focusing the light produced by said light source.

12. (Original): The instrument pointer illuminating apparatus of claim 1 further including a reflector surrounding said gage motor shaft adapted to reflect light from said light sources upward into said pointer.

13. (Original): The instrument pointer illuminating apparatus of claim 12 further including a light collector surrounding said reflector adapted to focus light from said light sources onto said reflector.

14. (Original): The instrument pointer illuminating apparatus of claim 13 wherein said light collector includes a plurality of lenses, one of said plurality of lenses being aligned with each of said light sources and adapted to focus light from said light sources onto said reflector.

15. (Previously Presented): The instrument pointer illuminating apparatus of claim 14 wherein said reflector is conical in shape, whereby light from

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said light sources can be collected from any angular position around said gage motor shaft and reflected upward into said light reflecting portion of said instrument pointer.

16. (Original): The instrument pointer illuminating apparatus of claim 15 wherein said lenses of said light collector are astigmatic lenses, whereby in the horizontal plane said lenses focus the light onto an axis coaxial with said gage motor shaft, and in the vertical plane said lenses focus the light into parallel beams.

17. (Original): The instrument pointer illuminating apparatus of claim 16 wherein said light sources are positioned around said gage motor shaft axially below said instrument pointer and radially outward of said light collector, whereby said light collector focuses light onto said reflector and said reflector reflects the light upward into said instrument pointer.

18. (Original): The instrument pointer illumination apparatus of claim 15 wherein said lenses of said light collector focus the light collected by said lenses into parallel beams.

19. (Original): The instrument pointer illumination apparatus of claim 18 wherein said light sources are positioned around said gage motor shaft and axially below said light collector and said light collector includes an internally reflective surface, whereby said lenses concentrate the light onto said internally reflective surface and said internally reflective surface reflects the light onto said reflector and

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said reflector reflects the light upward into said light collecting portion of said instrument pointer.

20. (Original): The instrument pointer illumination apparatus of claim 19 wherein said internally reflective surface is conical in shape so that light from any of said light sources at any angular position around said gage motor shaft will be reflected onto said reflector and upward into said light collecting portion of said instrument pointer.

21. (Original): The instrument pointer illumination apparatus of claim 1 wherein said light sources are light emitting diodes.

22. (Previously Presented): An instrument pointer illuminating apparatus comprising:

a gage motor with a gage motor shaft extending therefrom;
an instrument pointer mounted onto said gage motor shaft, said instrument pointer including a hub with a top surface and a bottom surface, a light reflecting portion mounted onto said top surface of said hub, and a needle portion extending from said light collecting portion;

a plurality of light sources positioned radially around said gage motor shaft adapted to supply light upward into said instrument pointer; and

a light guide mounted to said bottom surface of said hub portion adapted to propagate light from said light sources upward into said instrument pointer;

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said light reflecting portion being flared across said top surface of said hub to substantially cover all of said top surface of said hub and having at least one reflective surface presenting an internally reflective surface adapted to reflect substantially all of the light received from said light sources outward into said needle portion at any angular position of said instrument portion.

23. (Previously Presented): The instrument pointer illuminating apparatus of claim 22 wherein said at least one reflective surface is a polynomial shaped concentrating surface, said reflective surface being positioned at an angle such that light reflected by said reflective surface is concentrated into said needle portion of said instrument pointer.

24. (Previously Presented): The instrument pointer illuminating apparatus of claim 23 wherein said at least one reflective surface comprises a first reflective surface and a second reflective surface, each of said first and second reflective surfaces being a polynomial shaped concentrating surface adapted to concentrate reflected light into said needle portion of said instrument pointer.

25. (Previously Presented): The instrument pointer illuminating apparatus of claim 24 further including a notch portion positioned between said first and second reflective surfaces, said second reflective surface being formed at an angel relative to said first reflective surface to compensate for refraction of light that travels through said notch portion, such that light that is incident upon either of the

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first or second reflective surfaces is reflected and concentrated outward into said needle portion of said instrument pointer.

26. (Previously Presented): The instrument pointer illuminating apparatus of claim 25 wherein said needle portion includes a top surface and a bottom surface, said top surface being coated with a top diffusing material adapted to diffuse light outward through said top surface, and said bottom surface being coated with a material adapted to internally reflect within said needle portion substantially all of the light which hits said bottom surface.

28. (Previously Presented): The instrument pointer illuminating apparatus of claim 25 wherein said light sources are positioned radially around said gage motor shaft and axially below said pointer and are adapted to supply light upward into said light collecting portion.

29. (Previously Presented): The instrument pointer illuminating apparatus of claim 25 wherein each of said light sources includes a lens for focusing the light produced by said light source.

30. (Previously Presented): The instrument pointer illuminating apparatus of claim 25 further including a reflector surrounding said gage motor shaft adapted to reflect light from said light sources upward into said pointer.

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31. (Previously Presented): The instrument pointer illuminating apparatus of claim 30 further including a light collector surrounding said reflector adapted to focus light from said light sources onto said reflector.

32. (Previously Presented): The instrument pointer illuminating apparatus of claim 31 wherein said light collector includes a plurality of lenses, one of said plurality of lenses being aligned with each of said light sources and adapted to focus light from said light sources onto said reflector.

33. (Previously Presented): The instrument pointer illuminating apparatus of claim 32 wherein said reflector is conical in shape, whereby light from said light sources can be collected from any angular position around said gage motor shaft and reflected upward into said light collection portion of said instrument pointer.

34. (Previously Presented): The instrument pointer illuminating apparatus of claim 33 wherein said lenses of said light collector are astigmatic lenses, whereby in the horizontal plane said lenses focus the light onto an axis coaxial with said gage motor shaft, and in the vertical plane said lenses focus the light into parallel beams.

35. (Previously Presented): The instrument pointer illuminating apparatus of claim 34 wherein said light sources are positioned around said gage motor shaft axially below said instrument pointer and radially outward of said light

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collector, whereby said light collector focuses light onto said reflector and said reflector reflects the light upward into said instrument pointer.

36. (Previously Presented): The instrument pointer illumination apparatus of claim 33 wherein said lenses of said light collector focus the light collected by said lenses into parallel beams.

37. (Previously Presented): The instrument pointer illumination apparatus of claim 36 wherein said light sources are positioned around said gage motor shaft and axially below said light collector and said light collector includes an internally reflective surface, whereby said lenses concentrate the light onto said internally reflective surface and said internally reflective surface reflects the light onto said reflector and said reflector reflects the light upward into said light collecting portion of said instrument pointer.

38. (Previously Presented): The instrument pointer illumination apparatus of claim 37 wherein said internally reflective surface is conical in shape so that light from any of said light sources at any angular position around said gage motor shaft will be reflected onto said reflector and upward into said light collecting portion of said instrument pointer.

39. (Previously Presented): The instrument pointer illumination apparatus of claim 25 wherein said light sources are light emitting diodes.